

SULFOAROYL END-CAPPED ESTER OF OLIGOMERS SUITABLE AS SOIL-RELEASE AGENTS IN DETERGENT COMPOSITIONS AND FABRIC-CONDITIONER ARTICLES

TECHNICAL FIELD

The present invention relates to novel ester compositions useful as soil-releasing ingredients in laundry products such as granular detergents and dryer-added fabric conditioner sheets.

BACKGROUND OF THE INVENTION

A substantial proportion of synthetic fabrics now in use are copolymers of ethylene glycol and terephthalic acid, sold under trade names which include DACRON, FORTREL, KODEL and BLUE C POLYESTER. The removal of oily soil and oily stains from the surface of such fabrics is well recognized to be technically difficult to achieve using laundry compositions of the type most generally accessible to consumers.

Substances which have been suggested for use in consumer products as soil release agents include polymers which contain ethylene terephthalate segments randomly interspersed with polyethylene glycol segments. See, for example, U.S. Pat. No. 3,962,152, Nicol et al, issued June 8, 1976. A soil release polyester of this type, commercially known as MILEASE T, is further disclosed in U.S. Pat. No. 4,116,885, Derstadt et al, issued Sept. 7, 1978. Other commercial variants are sold as PERMALOSE, ZELCON and ALKARIL products (see, for example, Canadian Patent No. 1,100,262, Becker et al, issued May 5, 1981; U.S. Pat. No. 4,238,531, Rudy et al, issued Dec. 9, 1980; and British Patent Application No. 2,172,608, Crossin, published Sept. 24, 1986). Commercial suppliers of soil release polyesters include ICI, duPont and Alkaryl (formerly Quaker Chemical Co.).

Soil release compositions used in industrial textile treatment applications are well-known. Application of such compositions is under controlled conditions and is free from the formulation constraints encountered in the detergent arts. Padding and heat curing, in the absence of high levels of detergent chemicals, are illustrative of the processes used. Polyesters have successfully been used for industrial soil release treatments of polyester surfaces, but recent trends are toward rather expensive fluorochemical treatments.

The development of economical, product-stable and formulation-compatible soil release agents for consumer product compositions is not straightforward. In contrast with the simple and controlled environments in which industrial textile treatment agents are generally used, soil release agents in consumer laundry products will usually be exposed to various detergent ingredients, such as anionic surfactants, alkaline builders and the like. Such chemicals may reduce the effectiveness of soil release agents, for example, by preventing their deposition on fabrics. The soil release agents may, reciprocally, reduce the laundry benefits of detergent ingredients, for example, by interfering with the action of surfactants, optical brighteners, antistatic agents or softeners, all of which are commonly present in modern detergent compositions. In a "thru-the-wash" mode, it is especially important that no formulation ingredient, including the soil release agent, should promote the

redeposition of suspended soils in the laundry liquor; this would dull the appearance of the laundered fabrics.

Arguably, the most difficult of consumer laundry products, for the purpose of incorporating soil release agents, are granular detergent compositions. Compatibility requirements of soil release agents, especially with the alkaline, anionic detergent environments commonly present in such detergent compositions, provide a substantial technical challenge.

The end-capped esters of the present invention have been developed to meet these needs.

It is an object of the present invention to provide novel compositions which can be used as effective and product-compatible soil release agents in consumer products having widely varying formulas, such as granular detergent compositions and fabric conditioner sheets.

It is a further object of the invention to provide novel ester oligomers and low molecular weight polyesters.

These and other objects are secured herein, as will be seen from the following disclosure.

BACKGROUND ART

Chemistry relevant to preparing the compositions of this invention includes aspects of what is colloquially known as "polyester chemistry" but, as opposed to high polymers such as fibrous or resinous polyesters with which polyester chemistry is principally concerned, novel linear, end-capped, low molecular weight oligomeric esters or polymeric esters are provided herein.

A. Soil Release Finishes

Handbook of Fiber Science and Technology, Marcel Dekker, New York, N.Y., 1984, Volume II, Part B, Chapter 3, entitled "Soil Release Finishes", is a recent review of soil release agents. Almost all of the soil release agents reviewed appear to find application principally outside the laundry detergent arts. The polyesters are generally nonionic, and have relatively high molecular weights.

B. Polyester Chemistry

Polyesters and Their Applications, Bjorksten et al, Reinhold, 1956, reviews the older and well-established art of polyester synthesis, with particular emphasis on high molecular weight, e.g., fiber-forming polyesters, and polyesters usable for making shaped articles.

C. Polyester Backbones

Ponnusamy et al, *Makromol. Chem.* 184, 1279-1284 (1983), discloses a recent synthesis and characterization of copolyesters of ethylene glycol, 1,2-propylene glycol, or mixtures thereof, with dimethyl terephthalate. Molecular weights of the products range from 4,000-6,000. Chemically similar materials, having higher molecular weights, are disclosed in U.S. Pat. No. 4,145,518, Morie et al, issued Mar. 20, 1979.

D. Capping Reagents and Capped Polyesters

U.S. Pat. No. 4,525,524, Tung et al, issued June 25, 1985, discloses aryl carboxylate end-capped poly(glycol terephthalate) esters. These polyesters are said to have increased affinity for water-based systems. The arylcarboxylates used to form the preferred polyesters incorporate NaO_3S groups.

E. End-capped Branched Polyesters

U.S. Pat. No. 4,554,328, Sinkler et al, issued Nov. 19, 1985, discloses a modified polymer suitable for use in making hollow containers by conventional extrusion blow molding. The polymer is a terephthalate-based polyester of high molecular weight. The polyester is branched rather than linear, due to the incorporation of